

REMARKS/ARGUMENTS

Examination and allowance of pending Claims 1-22 are respectfully requested. Claims 1, 2, 5, and 14 have been amended. No claims have been cancelled and no new claims have been added.

The drawings were objected to by the Examiner under 37 CFR § 1.83(a). The drawings must show every feature of the invention specified in the claims.

The Examiner stated that the feature "a pressurized air unit providing a continual flow of air" must be shown or the feature canceled from the claims. Applicants have amended Claim 2 canceling, "a pressurized air unit providing a continual flow of air" from the claim. Applicants contend that the currently amended claim does not enter any new matter. The remaining recitation of "pressurized air" in Claim 2 is supported in the specification at page 6, lines 27 to page 7, line 4.

Applicants are herewith simultaneously submitting formal drawings to the Official Draftsperson addressing all objections under 37 CFR § 1.84(I).

The Examiner objected to Claims 5-10 because of informalities.

With regard to Claim 5, the Examiner objected to the use of an air bearing motor for creating unnecessary ambiguity. Applicants have amended Claim 5 as per the Examiner suggestion by changing "an air bearing motor" to --a driving motor--.

The Examiner also objected to recitation "further configured for rotation with zero frictional resistance" as being improper. Applicant found this recitation

in Claims 1, 2, and 14 and amended these claims to recite, --substantially zero resistance-- as per Examiner's suggestion.

The Examiner rejected Claims 14-22 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Examiner stated that Claim 14 recites the limitation "the predetermined amount" in line 11 for which there is insufficient antecedent basis in the claim.

Applicants have amended Claim 14 to provide the proper antecedent basis for this limitation found in two places in Claim 14.

Further, regarding claim 14, the Examiner stated that coupling the grinding wheel such that the wheel "tends" to pivot about the axis is ambiguous.

Applicants have also amended Claim 14 by removing the phrase "tends to pivot" and replacing it with --pivots--.

Accordingly, Applicants submit that the new amendments made as discussed above render all claims and specifically Claims 5-10 and Claim 14 and dependent Claims 15-22 proper under 35 U.S.C. § 112, second paragraph. As such, the rejections should be removed.

Claims 1-3, 5, 8 and 13 are rejected under 35 U.S.C. § 102(b) as being anticipated by Lange et al. (4,493,166).

Lange neither describes nor suggests ... an air bearing support member configured to pivot about an axis of rotation with substantially zero frictional resistance opposing said pivotal movement ... a grinding unit coupled to the air bearing support member, the grinding unit being configured to directly apply a predetermined force normal to the at least one edge to remove a predetermined amount of material from the at least one edge while tracking the at least one edge, the predetermined force being directly proportional to the predetermined amount and less than a normal force resulting in glass substrate breakage ... as recited in Applicants' Claim 1.

Lange describes a device commonly referred to by those skilled in the art as a pantograph or a tracer assist. The Lange cutting device, which could be a grinding wheel, is connected to a drive mechanism whose motions are controlled using an external guide; in Lange, this external guide is a cam follower. Lange's cam follower is supported by the platform for engagement with the contoured cam surface. (Lange, Abstract). Thus, there is no *direct force normal* to the edge of the substrate as in Applicants' invention.

The Examiner states that Lange et al. discloses all of the limitations of Applicants' Claim 1, i.e., an apparatus comprising an air bearing support member configured to pivot about an axis, and a grinding unit coupled to the air bearing member (Abstract), meeting all the limitations of claims 2, 3, 5 and 8.

However, Applicants argue that Lange does not describe or suggest ... the grinding unit being configured to directly apply a predetermined force normal to the at least one edge to remove a predetermined amount of material from the at least one edge while tracking the at least one edge ... as recited in Applicants' base Claim 1.

Applicants contend that Lange does not apply a predetermined force normal to the edge of a substrate and further Lange's force is not directly applied but rather indirectly applied through a cam follower.

Applicants intent is to control the position of the grinding unit using a predetermined force. Lange controls the location of the grinding wheel using a guide. Further, nowhere in Lange is there a description or a suggestion to control the force on the part being machined, as is the intent in Applicants invention. Nowhere does Lange describe or suggest requiring a predetermined normal force being directly applied to the edge of the substrate and as is recited in Applicants' Claim 1.

The material removal recited in Applicants' Claim 1 is controlled by existing geometry of the unit and not by an external guide or source. Lange requires an external guide, such as a cam follower, to control the force.

Even assuming *arguendo* there was a normal force found in Lange, because of Lange's apparatus, this force would not be applied to the edge as in Applicants' Claims but rather to the external guiding mechanism.

Accordingly, Applicants claims that each and every feature of the claim as arranged in the Applicants Claim 1 is not taught or disclosed by the cited prior art reference and hence a *prima facie* case of anticipation has not been made. For that reason, Applicants base Claim 1 and dependent Claims 2-3, 5, 8 and 13, which directly or indirectly depend from Claim 1, are patentably distinct over the Lange reference under 35 U.S.C. § 102(b) and thus the rejection should be removed.

Claims 6, 7, 9 and 10 are rejected under U.S.C. § 103(a) as being unpatentable over Lange et al.

Lange neither describes nor suggests ... wherein the grinding wheel is a 450 grit grinding wheel... as recited in Applicants' Claim 6, nor ... wherein the grinding wheel is a 600 grit grinding wheel... as recited in Applicants' Claim 7, nor ... wherein the predetermined force is substantially within the range of 1N – 6N, and the predetermined amount is substantially within the range of 25 microns – 150 microns ... as recited in Applicants' Claim 9, nor... wherein the predetermined force is substantially equal to 4N and the predetermined amount of material removed from the edge is substantially equal to 100 microns as recited in Applicants' Claim 10.

Applicants assert that Lange et al. does not meet all of the limitations of the above claims, different grits of the grinding wheel and the applied pressure and further that it would not have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Lange et al. by using the specific grinding wheel and/or pressure applied, to accommodate the work-piece and/or operational parameters. Lange's use of a cam follower as a secondary guide teaches away from Applicants' invention and as such renders one of skill in the art to not think of using a predetermined force, applied pressure and grits as possible with Applicants' invention.

Accordingly, and for reasons discussed above in conjunction with Applicants' base Claim 1, dependent Claims 6, 7, 9, and 10 which directly or indirectly depend from base Claim 1, are patentably distinct over the Lange reference under 35 U.S.C. § 103(a) and thus the rejection should be removed.

Claims 1, 2, 13 and 14-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over either Sakurai et al. (4,667,443) or Stock et al. (6,099,385) in view of either Lougher et al. (6,409,580) or Duescher (6,769,969).

Neither Sakurai nor Stock describes or suggests, whether taken together or separately from Lougher or Duescher, ... an air bearing support member configured to pivot about an axis of rotation with ... zero frictional resistance opposing said pivotal movement ... a grinding unit coupled to the air bearing support member, the grinding unit being configured to directly apply a predetermined force normal to the at least one edge to remove a predetermined amount of material from the at least one edge while tracking the at least one edge, the predetermined force being directly proportional to the predetermined amount and less than a normal force resulting in glass substrate breakage ... as recited in Applicants' Claim 1.

Neither Sakurai nor Stock describes or suggests whether taken together or separately with Lougher or Duescher ... *providing an air bearing support member* configured to pivot about an axis of rotation with zero frictional resistance opposing said pivotal movement, *coupling a grinding wheel to the air bearing support member*, such that the grinding wheel pivots about the axis of rotation; positioning the grinding wheel at a corner of the glass substrate, the grinding wheel being in contact with the at least one edge; loading the grinding wheel to thereby *apply a predetermined force normal to the at least one edge*, the predetermined force being directly proportional to a predetermined amount and less than a normal force resulting in glass substrate breakage; and moving the glass substrate in a tangential direction relative to the grinding wheel to remove the predetermined amount of material from the at least one edge... as recited in Applicants' base Claim 14.

Sakurai et al. discloses a one-joint type horizontal pivot arm adopted as a contour tracing mechanism to control the part geometry. There is no disclosure in Sakurai of an *air bearing support member*, nor of a grinding unit *coupled to* the *air bearing support member*, nor of the grinding unit being configured to *directly* apply a *predetermined force normal to the ... edge* to remove a predetermined amount of material ... as recited in Applicants' Claim 1 and similarly in Applicants' base method Claim 14. There is no suggestion in Sakurai to provide an air bearing support member and Applicants fail to see in Sakurai where the force is applied to the part being machined (such as the edge of the substrate) as opposed to an outside guide or elsewhere.

Stock discloses a method for removing edge areas of a laminated panel. Again, Applicants fail to see in Stock an *air bearing support member*, or a grinding unit *coupled to* the *air bearing support member*, or the grinding unit being configured to *directly* apply a *predetermined force normal to the ... edge* to remove a predetermined amount of material ... as recited in Applicants' Claim 1 and similar Claim 14.

Though Lougher mentions an air bearing support member it describes a generally slow process of polishing where the part geometry is typically changed or affected which would teach away from Applicants' invention. Similarly, Duescher describes the use of an abrasive material with raised surfaces, a use which is not practical on a thin surface edge such as with Applicants' glass substrates. Hence, Applicants contend that modifying Sakurai or Stock by providing Lougher's air bearing support or other types of gimbaling or Duescher's pivotal movement along the edge would be teaching away from Applicants' claimed combination.

Even assuming *arguendo* that there was motivation to combine the cited prior art references, Sakurai or Stock with Lougher or Duescher, as the Examiner states, Applicants contend that the combination would not result in Applicants' Claim 1 or Claim 14 elements. None of the combinations would result in having a directly applied predetermined force normal to the edge to remove a predetermined amount of material as recited in Applicants' Claims 1 and 14.

Accordingly Applicants' base Claims 1 and 14, and hence dependent Claims 2, 13, and 15-22 respectively, are patentably distinct over prior art (Sakurai or Stock in view of Lougher or Duescher) references under 35 U.S.C. § 103(a) and thus the rejection should be removed.

Dependent Claims 11, 12 and 22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over prior art as applied to claims 1 and 14 above, and further in view of Clark et al. (6,428,390).

As discussed above, prior art (Sakurai/Stock in view of Lougher/Duescher) as applied to claims 1 and 14 does not meet the limitations of the above claims, and further do not disclose or suggest, whether taken together or separately ... a conveyor system disposed proximate the grinding unit, the conveyor unit being configured to support the glass substrate, and move the glass substrate in a tangential direction relative to the grinding unit during grinding and/or polishing process steps ... as recited in Applicants' Claim 11, ... a vacuum chuck for holding the glass substrate in a fixed position during the grinding and/or polishing process steps; a conveyor coupled to the vacuum chuck, the conveyor being configured to move the vacuum chuck in a linear direction relative to the grinding unit at a predetermined rate; and a coolant mechanism disposed proximate an interface of the grinding unit and the at least one edge ... as recited in Applicants' Claim 12, ... the predetermined linear velocity is

approximately 5 meters/minute ... as recited in Applicants' Claim 22.

The Examiner states that workpiece transfer systems comprising conveyors are known in the art as evidenced by Clark et al, prior art assigned to the same assignee as Applicants' invention. It would not have been obvious to one of ordinary skill in the art at the time the invention was made, to piece together Applicants' claims by further modifying the prior art with workpiece transport means as taught by Clark et al. as an efficient means of transferring and securing the workpiece during the operation since unlike Applicants' frictionless invention, Clark discloses a system with frictional force.

Regarding the coolant, the Examiner states that Sakurai et al. discloses cooling the workpiece during operation, as it is well known in the art and modifying Stock et al. with coolant means would be well within the knowledge of one ordinary skill in the art to enhance the operation.

Applicants argue that there is no motivation suggested within these prior art references to make them combinable to piece together to formulate the recitations found in Applicants' dependent claims.

Accordingly, and for reasons discussed above, dependent Claims 11, 12, and 22 which depend from Applicants' base Claims 1 and 14, respectively, are patentably distinct over prior art (Sakurai or Stock in view of Lougher or Duescher) references under 35 U.S.C. § 103(a) and thus this rejection should also be removed.

Applicants note the Examiner's objection to Applicants Claim 4 indicating that it would be allowable if rewritten in independent form including all of the limitations of the base claim and intervening claims.

CONCLUSION


Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Joanne N. Pappas at 978-635-2289.

Respectfully submitted,

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